

Impact of Aging on Liver and Liver Disease

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ABSTRACT –

Aging is a natural phenomenon. It is law of nature. Aging is characterized by a Progressive decline of cellular function. Diet is considered the main environmental factor having effect on lifespan. There are evident changes in the function as well as histology of liver with the decade of life. The liver is a complex metabolic organ that is essential for maintaining whole body homeostatis via regulation of energy metabolism and molecular biosynthesis. Overall function is less affected by age than other organ of body, liver size gradually decrease with the aging . Hepatic blood flow decreases, leading to altered metabolic clearance of certain drugs. The liver has a remarkable ability to regenerate and maintain function during the aging process . Liver size reduce by 25 % between the age of 20 and 70 , with a 33% reduction of Hepatic blood flow in over 65 year old . Liver ability decrease with the stress. At the microcirculatory level , liver sinusoids demonstrate endothelial thickening and loss of function with aging .Liver progressively shrinks by 20-40 % during the course of a human life and volume also decrease. Drug therapy in the elderly may be complicated by several factors such as decline in body weight liver mass and Hepatic blood flow . Aging is characterized by cellular senescence and alteration of metabolic pathways. According to ayurveda liver is a moola of raktavahastrotas. With the aging changes in liver shows symptoms such as fatigue, weakness and weight loss. In this machinery life, men is running behind money ignoring the tripod of life (Ahaar,nidra,brahmcharya).Ignorance of Ahaa,nidra,bhramcharya are major cause of early

aging of liver. Symptoms of alcoholic liver cirrhosis typically develop when a person in between the ages of 30 and 40. Stress level increase the risk of liver disease. Risk factor for fatty liver is cardiovascular disease, obesity and blood pressure.

Key words – Aging, Alcoholic liver disease, fibrosis, cirrhosis, hepatitis, liver.

I. INTRODUCTION-

A number of structural and microscopic changes occur as the liver ages. The ability of the liver to metabolize many substances decreases with aging. Aging has been shown to not only enhance vulnerability to acute liver injury but also increase susceptibility of the fibrotic response. Aging is a condition in which a person gradually loses the ability to maintain homeostasis, due to structural alteration or dysfunction and subsequently becomes vulnerable to external stress or damage.¹ The liver is the largest gland in the body and has wide variety of functions. The liver is soft and occupies the upper part of the abdominal cavity just beneath the diaphragm. The liver occupies the whole of the right hypochondrium. The greater part of the epigastrum and extends into the left hypochondrium reaching up to the left lateral line. The greater part of the liver is situated under cover of the right costal margin and the right hemidiaphragm separate it from the pleura, lungs pericardium and heart. Liver has two lobes large right lobe and small left lobe by the attachment of the peritoneum of the falciform ligament. The right lobe is further divided into a quadrate lobe and a caudate lobe by the presence of the gall bladder, the fissure for the ligamentum teres, the IVC and the

fissure for the ligamentum venosum. The right and left branches of the Hepatic artery and portal vein and the right and left Hepatic ducts are distributed to the right lobe and left lobe. The basic function of liver is production and secretion of bile, which is passed into the intestinal tract. Involvement in many metabolic activities related to carbohydrates, fat, protein metabolism and filtration of blood, removing bacteria and other foreign particles that have gained entrance to the blood from the lumen of the intestine. Inflammation of the liver is called hepatitis, it may be infective hepatitis or amoebic hepatitis. Aging is a major risk factor for most chronic diseases.

Aging and liver cells- Aging is associated with gradual alteration of Hepatic structure and function as well as various changes in liver cells including Hepatic sinusoidal endothelial cells.² The volume and blood flow of the liver gradually decrease with aging. Lipofuscin (accumulation of dense bodies) are highly cross-linked undegradable protein aggregates that are formed when proteins damaged and denatured by oxidative stress are not degraded inside the liver cells. Such lipofuscins cause increased generation of reactive oxygen species (ROS) in cells and reduced cell survivability.

With old age, the thickness of LSECs (Liver sinusoidal endothelial cells) is enlarged by 50%, whereas the number and diameter of fenestration (pores) are reduced.

According to studies using ultrasound, the liver volume decreases by 20-40% as one gets older. Such changes are related to a decline in the blood flow in the liver, in that those aged 65 years or higher showed an approximately 35% decrease in the blood volume of the liver compared with those aged less than 40 years. The metabolism of the low density lipoprotein cholesterol decreases by 35%.³ The serum gamma-glutamyl transferase and alkaline phosphatase levels are elevated with aging. Although the serum aminotransferase maintains the normal level, the serum bilirubin is gradually reduced, as humans get older. Liver fibrosis is a consequence of the excessive healing response triggered by chronic liver injury.

II. LITERATURE REVIEW –

In ayurveda liver is a moola of a raktavahastrotas. Liver is a vital organ for chayapachaya (metabolism) of consumed food. Acharya have opined about the Genesis of yakrit from raktadhatu as ayurveda narrates the basic principles including panchmahabhoota,

tridosha, saptadhatu etc. In view of embryology and organogenesis. The various organs generate from different combinations of mahabhoota and specially raktadhatu (blood tissue) in the context of the liver.⁴

Ayurveda concept: According to ayurveda liver is known as “Takima” or “yakna”.

Synonyms like kalakhanda, jyotisthana, yakritkhanda, yakritpinda, raktadhara and raktashaya are found in the ancient literature for liver. Sushruta explains that foetal nutrition usually depends on ahara rasa, categorized under maternal factors and vayu present in jyotisthana, responsible for cell division.⁵

The ahara rasa is first received by jyotisthana, which further nourishes the whole body. Therefore, jyotisthana is perceived as “Liver”. In ashtangahridaya, Acharya Vagbhata has used the word yakritkhanda with regards to the description of diseases which is indication for the lobes of liver. Yakrit is a site of raktadhatu, where blood is stored therefore, raktadhara or raktashaya words are perceived as synonym of liver and used in ayurveda samhitas.

VARNA (COLOR) :

The color of vidradhi is similar to the color of yakrit i.e. krishnalohitam (reddish brown).

Acharya Vagbhata has compared the color of pittajaarsha with shukhjivha, i.e. tongue of parrot, yakritkhanda and jalouka. In sharir sthana, he has stated the critical condition of the patient in atisara (diarrhoea) - If the color of stool is like the yakritpinda or mansadhovana, the patient will not survive.

SVARUPA (APPEARANCE) :

According to Brihadaranyakaupnishad, the appearance of yakrit and pleeha are solid structure like mountains.

STHANA (SITE) –

Acharya Arundatta – the site of the liver is below and right to the heart.

III. AIM AND OBJECTIVE –

To re-evaluate, discuss and elaborate the various ayurvedic concepts and principles related to liver with aging process. To understand the health related problems of the liver associated with aging. With the aging liver functions gradually decrease that's why we should know that how liver will remain healthy. Aging is a natural and yapa (papliative) disease and also a risk factor for many diseases, such as hepatitis A, hepatitis B

,hepatitis C , hepatitis E , cirrhosis ,fibrosis , non – alcoholic fatty liver disease etc.

IV. MATERIAL AND METHODS –

This paper is based on a review of ayurvedic texts. Material related to aging, liver and other relevant topics have been collected .

Some modern books, research articles, general, internet etc.

The present description and correlation of ancient though opens a new window on the applicability of this concept in management of Hepatic disorders for modern medicine and for the 20th century ayurvedaphysician evaluate the efficacy of drugs acting on raktavahastrotasa .

DISCUSSION –

Liver is called engine of the body , it has many important role in digesting , metabolizing and manufacturing essential compound for keeping the body healthy .This organ is responsible for converting rasa dhatu (clear plasma) to raktadhatu (blood) , scan and identify toxins in the rasa dhatu and store them so they don't enter the blood .This maintains the purity of the blood by keeping ama (impurities) from mixing with it . The liver produces and secretes bile, using it to break down and digest fatty acids. It produces blood clotting factors and at the same time creates protective elements that keep blood clots from blocking the circulatory system. It converts sugar into glycogen and stores it for use by the muscles in the form of glucose energy. The liver begins as a hollow endodermal bud from the foregut during the 3rd week of the gestation.The bud separates into two parts – Hepatic and biliary .

The Hepatic part contains bi – potential progenitor cells that form the early primitive bile duct .This condition of rapidly growing cells penetrates in the adjacent mesodermal tissue .Because the liver is the seat of pitta dosha , pitta based problems of skin inflammation can be a direct result of liver imbalance. The liver is composed of five bhutaagnis (digestive fires) that corresponds to the five elements of Earth (prithvi) , fire (Tejas) , water (aap) , air (vayu) and space (akasha) each specializing in digesting that particular element in the food and transform rasa dhatu to blood tissue .

If there flames burns too high or too low or unevenly, then the rasa dhatu will not be properly converted into blood tissue and toxins will enter the blood.With aging jhatharagni is weak and imbalance of bile. All of these functions are governed by ranjaka pitta and if it loses its balance

, it can affect the blood and skin and result in inflammatory problems such as skin breakouts , acne ,cold ,sores etc.

Liver fibrosis- Liver fibrosis is a consequence of the excessive healing response triggered by chronic liver injury. In the end stage of liver fibrosis, cirrhosis, the destruction of the normal architecture and the loss of hepatocytes prevent the liver from its normal synthetic and metabolic function. Aging has been considered as a risk factor for progression of fibrosis in hepatitis C and for poor outcome in alcoholic hepatitis.⁴ Aging is generally correlated with increased oxidative stress and reduced tolerance to oxidative damage.An increased inflammatory reaction mainly composed of lymphocytes and macrophages expressing helper T cell type2 cytokines is the main factor involved in the higher susceptibility to fibrosis with increase age.⁶

Non-alcoholic fatty liver disease-

Nonalcoholic fatty liver disease (NAFLD) includes steatosis (an accumulation of extra fat in the liver), nonalcoholic steatohepatitis (NASH) accompanied by inflammation resulting from damaged hepatic cells, liver fibrosis and liver cirrhosis. Generally, the prevalence rate of the NAFLD among adults is estimated to be 15-30%. The prevalence rate of the NAFLD shows an increasing tendency as one gets older.⁷

Insulin resistance, which is known to be a primary cause of the NAFLD, is a major component of the metabolic syndrome, which is often observed in elderly people. Aging, which is accompanied by abdominal obesity and excessive visceral fat, cause insulin resistance and an increased secretion of proinflammatory cytokines and subsequently, results in the metabolic syndromes and type 2 diabetes. In insulin resistance, the secretion of free fatty acids is intensified in the liver by an increased intake of free fatty acids. Molecular mechanisms for the accumulation of excessive fat in the liver and damage to hepatic cells due to aging include DNA damage.⁸

Alcoholic liver disease (ALD) –

Excessive alcohol consumption rate has been on the rise among elderly people because of social isolation, divorce or bereavement with their spouses, or depression. The clinical symptoms of alcohol liver disease among the elderly are similar to their younger counterparts, but their prevalence of complication is higher than other age group. Among patients with alcohol liver disease who are

older than 60 years, about 79% suffer complications such as alcohol liver cirrhosis.⁹

V. CONCLUSION –

Aging is characterized by cellular senescence and alteration of metabolic pathways. Aging has been shown to not only enhance vulnerability to acute liver injury but also increase susceptibility of the fibrotic response. Aging has a significant impact on the risk and poor prognosis of various liver disease including NAFLD, alcoholic liver disease etc.

Natural balancing of liver through life style. Do not skip or delay your meals ,which help In balancing pitta .It is preferable to dine early and sleep before 10:00 pm . Lack of sleep has been shown to disturb metabolism of glucose , resulting in weight gain.Avoid the situation leading to conflict or anger due to work pressure. Regular practice of yoga specially meditation reduces mental stress and help in optimum liver function.Take proper care to balance your liver function which help in generating more energy ,developing glossy skin and stronger immunity . Use of many herbal medicines which have hepatoprotective functions are indicated in ayurveda .

Ayurveda also advice proper diet and exercise that prevent Hepatic disease .Alcohol , sugary food , salt , red meat are to be avoided for good health of liver .Sunthi , mulethi , punarnava ,satavari , aragvadh and amalaki etc are good for liver health .

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